

been found. The meteorological notices include for each month of each year the highest, lowest, and mean readings of the barometer, the maximum and minimum temperature in the shade, the number of times the thermometer stood above certain points varying with the seasons of the year, the maximum in the sun, the minimum on the grass, amount of rain collected, and the number of rainy days. The wettest year of the twenty was 1882, when the rainfall was 43.79 inches; the driest, 1870, with 23.41 inches. The weather records in these tables have been kept by one observer, with properly verified instruments, and all the observations have been critically examined at the Royal Meteorological Society; the botanical notices, though obtained by a large staff of observers, have all been recorded by one person, who saw all the specimens; but entomological and ornithological notes were taken by a series of recorders, and there is therefore not the same uniformity as in the two previous cases.

We have received the annual report of the West Kent Natural History, Microscopical, and Photographic Society for the past year. It contains abstracts of several papers read during the year. It is a pity there is no abstract of the discussion introduced by the president at the annual dinner at Gravesend, on "Bacon and Beans." There are two papers on subjects connected with photography.

MR. W. F. STANLEY has recently brought out a new form of protractor and goniometer, which has the special merit of measuring an angle right up to the vertex. This new form of protractor will be very convenient to civil engineers in measuring angles upon ordnance maps which are most frequently subtended by short lines, and many other cases. Used as a goniometer, it will be very convenient to measure the angles of large crystals and planes of cleavage, also to draw the same direct from the instrument. The instrument consists of two concentric circles, the outer one carrying the graduation, the inner a Vernier; each supports an arm with an edge extending to the centre. The angles are measured by slipping the inner circle with its attached arm and Vernier round the groove on the outer circle, which keeps it in position. We believe the instrument has all the good points which Mr. Stanley claims for it, and it will be useful to artists as well in determining angles of perspective.

THE whitefish (*Coregonus albus*) now in the ponds at the Delaford Fishery are growing rapidly, some of them reaching seven inches in length. It will be remembered that the ova of these fish were brought from America last spring, and hatched out at South Kensington.

A REMNANT of the great forests which once covered the south of Sweden was recently dug out of a bog at Kiuneved, consisting of a boat 6 feet in diameter hollowed out of a log. The tree from which it was obtained must have been 20 feet in circumference. The wood, which was blue in colour, was very hard, and the boat so heavy that two bullocks could not move it.

MR. HENRY PHILLIPS, jun, one of the secretaries to the American Philosophical Society, has performed a very useful work in compiling a register of all the papers published in the *Transactions and Proceedings* of the Society since its commencement. The "register" forms a small pamphlet of fifty-six pages, the titles being arranged according to the authors' names. It is therefore an index to all the publications of the Society—but a name, not a subject, index.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus rhesus* ♂) from India, presented by Mr. E. Pelditch; a Bosmani Potto (*Pterodicticus potto* ♂) from West Africa, presented by Mr. C. R. Williams; two Gerbilles (*Gerbillus* —) from Suakim, presented by Surgeon-Major J. A. Shaw; two White-faced Tree

Ducks (*Dendrocygna viduata*) from West Africa, presented by Mr. Cecil Dudley; three Green Turtles (*Chelone viridis*) from the West Indies, presented by M. C. Angel, F.Z.S.; a Bonnet Monkey (*Macacus sinicus* ♀) from India, presented by Mr. J. C. O'Halloran; two Narrow-barred Finches (*Munia nisia*) from Java, an Indian Silver Bill (*Munia malabarica*) from India, an Amaduvade Finch (*Estrela amandava*) from India, presented by Mr. Horace Sanders; a Short-toed Eagle (*Circus gallicus*) from Southern Europe, presented by Mr. Henry Sotheman; a Mona Monkey (*Cercopithecus mona* ♂) from West Africa, presented by Mr. White; a White-necked Crow (*Corvus scapularis*) from West Africa, deposited; nine Gold Pheasants (*Thaumalea picta*), received from the Right Hon. George Selater-Booth, M.P.; a Barred-shouldered Dove (*Geopelia humeralis*), a Coquerel's Lemur (*Chirolagus coquereli*), a Collared Fruit Bat (*Cynonycteris collaris*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE BINARY-STAR 70 OPHIUCHI.—Notwithstanding the care with which the orbit of this double-star has been discussed, the companion appears to be again deviating from its predicted position to a considerable extent. It will be remembered that from the anomalous motion of the smaller star Madler was led to the suspicion that the law of gravitation does not apply in this system, while Jacob thought there was indication of disturbance from a third body.

M. Perrotin gives the following epoch resulting from his measures made at Nice in 1883:

1883.49 ... Position 45° 6' ... Distance 2".28

On comparing with the orbit assigned in No. 1 of "Astronomical Observations made at the University Observatory, Oxford," which accords closely with the measures up to 1878, and with the orbits Flammarion, Tisserand, and Schur, we find the following differences taken in the order, observation—calculation:—

	Position.	Distance.
The Oxford orbit	- 9°.9	- 0".60
Flammarion	- 12°.8	- 0".18
Tisserand	- 13°.5	- 0".57
Schur	- 17°.4	- 0".73

It is very possible that in this case the difficulty of representing the position of the companion-star may be attributed to the paucity of measures near the peri-astron, rather than to an anomalous motion which has not been remarked in most of the other binaries. However this may be, the object no doubt is one deserving of continued attention. The Oxford orbit, which, it will be seen, is the nearest as regards the position angle in 1883, gives for 1885.5—position, 44°.6; distance, 2".64.

TUTTLE'S COMET.—On September 10, at midnight, this comet will be in about R.A. 136° 33', Decl. +3° 48', rising at Greenwich two hours before the sun, and with an intensity of light one-third greater than when first observed at Nice on August 8. It may perhaps be observed after perihelion in the southern hemisphere if the more powerful telescopes are utilised. On August 13 the correction to Herr Raht's ephemeris was -13s. in right ascension and +5'.5 in declination. The comet is about 2' in diameter, without very apparent central condensation.

THE COMET OF 1652.—At present we have only one calculation of the orbit of this comet—that of Halley, founded upon the observations of Hevelius in the scarce volume of the "Machina Cœlestis." It would be interesting to investigate the orbit anew from the observations made by Richard White at Rome, though he gives no nearer time for his distances of the comet from stars between December 21, 1652, and January 3, 1652, than "hora 2 post occasum solis." The observations will be found in *Zeitschrift für Astronomie*, vol. iv., where they are entitled "Observationes Cometæ, qui exente anno 1652 comparuit, habitæ Romæ per Riccardum Albium, Anglum." Zach supposed the observer to be Richard White, and there can be little doubt that he is the Mr. White repeatedly mentioned by Evelyn in his Diary. Zach has the remark, "Diese Beobachtungen können leicht besser als die des Hevelius seyn," and an examination of the latter will show that there is some foundation

for this remark. On December 21, according to Halley's elements, the distance of the comet from the earth was only 0.14; on January 3 it had increased to 0.42.

The fact that the place of the ascending node of the comet of 1698, as it is printed in Halley's "Synopsis of Cometary Astronomy," is 180° in error, or, in other words, the place of the descending node has been given for that of the opposite one, furnishes a hint that it is not safe to accept a single calculation of the orbit of any of the earlier-computed comets without examination.

ASTRONOMICAL PHENOMENA FOR THE WEEK, 1885, AUGUST 30 TO SEPTEMBER 5

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on August 30

Sun rises, 5h. 11m.; souths, 12h. 0m. 23.0s.; sets, 18h. 49m.; decl. on meridian, $8^\circ 52' N.$; Sidereal Time at Sunset, 17h. 26m.

Moon (at Last Quarter on Sept. 2) rises, 20h. 28m.*; souths, 3h. 15m.; sets, 10h. 12m.; decl. on meridian, $8^\circ 11' N.$

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian
Mercury ...	6 1 ...	12 17 ...	18 33 ...	$2^\circ 28' N.$
Venus ...	8 7 ...	13 57 ...	19 47 ...	$2^\circ 47' S.$
Mars ...	0 36 ...	8 48 ...	17 0 ...	$22^\circ 50' N.$
Jupiter ...	5 48 ...	12 28 ...	19 8 ...	$7^\circ 6' N.$
Saturn ...	23 43* ...	7 52 ...	16 1 ...	$22^\circ 25' N.$

* Indicates that the rising is that of the preceding day.

Occultations of Stars by the Moon

Sept.	Star	Mag.	Disap.	Reap.	Corresponding angles from ver- tex to right for inverted image
			h. m.	h. m.	
1 ...	6° Tauri ...	$4\frac{1}{2}$...	22 1 ...	22 52 ...	$62^\circ 24'$
1 ...	0° Tauri ...	$4\frac{1}{2}$...	22 2 ...	22 51 ...	$82^\circ 22'$
1 ...	B.A.C. 1391 ...	5 ...	23 1 ...	23 32 ...	$117^\circ 18'$
1 ...	81 Tauri ...	$5\frac{1}{2}$...	23 9 near approach	333 —	—
1 ...	85 Tauri ...	6 ...	23 21 ...	0 1† ...	$20^\circ 28'$
2 ...	Aldebaran ...	1 ...	1 40 near approach	154 —	—
2 ...	117 Tauri ...	6 ...	22 34 ...	23 20 ...	$84^\circ 22'$
3 ...	B.A.C. 1728 ...	6 ...	0 13 ...	0 48 ...	$9^\circ 288'$
4 ...	26 Geminorum ...	$5\frac{1}{2}$...	4 57 near approach	146 —	—
5 ...	68 Geminorum ...	$5\frac{1}{2}$...	0 58 near approach	323 —	—

† Occurs on the following day.

The Occultations of Stars are such as are visible at Greenwich.

Sept.	h.	
2 ...	18 ...	Mercury in inferior conjunction with the Sun.
4 ...	3 ...	Saturn in conjunction with and $4^\circ 17'$ north of the Moon.
5 ...	7 ...	Mars in conjunction with and $5^\circ 33'$ north of the Moon.

GEOGRAPHICAL NOTES

SAD news has been received from the Dutch African Expedition; its leader, Mr. D. D. Veth, died from disease on May 19, in the camp on the banks of the Kala-Kanga River, between Benguela and Humpata. This is a real loss for science as well as to his venerable father, Prof. P. J. Veth, who has given his whole industrious life to scientific work.

THE Austrian Government, with the consent of the Porte, has undertaken to make a geographical survey of the Albanian coast, with a view to preparing new maps. Two Austrian gunboats have accordingly left for Corfu with officials of the Chart Department on board. Here they will be joined by the Turkish officers, under whose superintendence the survey will be made.

It is stated in the latest *Ergänzungsheft* to *Petermann's Mittheilungen*, that there are in Peking four institutions at which astronomical and meteorological observations have been made for a number of years: (1) the Chinese Observatory, called *Kuan sang tai*, which has existed for about six centuries. In 1674 the Jesuits provided it with new astronomical instruments, without lenses, which are well preserved to this day. It is situated on the eastern wall of the Manchu town. (2) Bethang, or the

Northern Church, the *Collegium Gallorum*, near the Imperial palace. Here in the middle of the eighteenth century the Jesuits erected an observatory, and made many astronomical observations, amongst them the transit of Venus of June 3, 1769. Besides these Père Amiot made meteorological observations for six years, from 1757 to 1762. (3) The Russian Legation, near the southern wall of the Manchu town. The astronomer Fuss, who made a great journey between 1830 and 1832 from St. Petersburg to Eastern Siberia, and by Kiachta to Peking, at the orders of the Academy of Sciences of St. Petersburg, spent seven months here, and organised astronomical, geographical, magnetic, and meteorological observations. (4) Beguan, about 300 metres from the north-eastern corner of the wall surrounding the Manchu city. Here the members of the Russian missionary body, and the native Christians under their direction, carried out a series of magnetic and meteorological observations between 1841 and 1860. In 1864 this Observatory was separated from the missionary establishment, and in 1867 the St. Petersburg Academy of Sciences selected Dr. H. Fritsche for its director, a position which he held for sixteen years. For twelve of these he lived in Peking, while the other four were spent for the most part in journeying through the Chinese Empire and Siberia, in order to inspect the meteorological stations and the three magnetic observatories at Ekaterinburg, Barnaul, and Nerchinsk, to establish new stations, and specially to obtain astronomical, geographical, and hypsometric observations in as large a number of places as possible. His investigations into the meteorology of Eastern Asia were published by the Academy in 1877, and he now publishes in the *Ergänzungsheft* above alluded to the results of his sixteen years' observations in other departments. He describes his numerous journeys in China, Mongolia, and Manchuria, and gives a mass of data with regard to the latitude and longitude of places, and their heights above the sea-level. There are also, in the second part of the paper, a large number of measurements connected with earth magnetism. The title of the paper, which is a long one, and represents a vast amount of travel and labour, is "Ein Beitrag zur Geographie und Lehre vom Erdmagnetismus Asiens und Europas," von Dr. H. Fritsche, *Petermann's Mittheilungen* *Ergänzungsheft*, No. 78.

IN the current number of *Petermann's Mittheilungen* the principal article is an account, historical and geographical, of "a lava desert in the interior of Iceland," and the largest lava area in Europe. The "desert" in question is situated in that part of the plateau in the interior which lies between the Vatnajökull and the rivers Skjálfandafjót and Jökulsá. It is known to the inhabitants of the neighbouring coasts as Odádhraun. The author, Th. Thoroddsen, describes his journey from Myvatn in detail.—Prof. Nell explains Fischer's perspective projection for maps, and gives a map of Asia on this system; while Herr Flegel describes his journey in 1879 with the Henry Venn expedition up the Pico Grande from the Cameroons.

THE *Zeitschrift* of the Gesellschaft für Erdkunde at Berlin (Band 20, Heft 3) is almost wholly occupied with an account by Herr Schmidt of the travels of the friar Rubruk between 1253 and 1255 into the heart of Central Asia, and to the borders of China. This remarkable journey is described and explained with much painstaking learning. The only other contribution to the number is a table of lengths of the principal Russian rivers from General Tillo's survey.

FROM the latest reports the Australian New Guinea expedition appears to have progressed satisfactorily so far. The Government of Queensland had offered to hold frequent communication with the party by means of the steamer *Albatross*, with a view of obtaining information of the progress of the work of exploration. A branch of the Geographical Society of Australasia is to be formed at Brisbane.

A PARLIAMENTARY blue-book (Corea, No. 3, 1885) lately published contains the report of a journey made by Mr. Carles, the Vice-Consul at Seoul, from that place to Ph्योंg Kang, where some gold mines exist. These lie to the west of the main road between Seoul and Gensan, and were stated to be of greater extent than any existing in Corea. They are in the Ph्योंg Kang district, in the neighbourhood of the town of Pai-namou-tjang, about 100 miles from the capital. Part of the road lay across a vast lava-field, which appears to exceed in extent even the largest in Iceland. Between Chhöl-wón and Pai-namou-tjang, a distance of 40 miles, there is only one break in its bed, which Mr. Carles attributes to the action of